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Via E-Mail

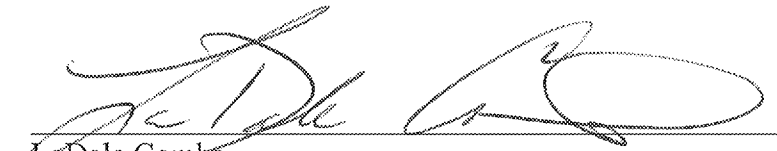
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Subject: AK Steel Dearborn Works – Civil Action No. 15-cv-11804
DJ # 90-5-2-1-10702

In accordance with the Consent Decree in the above-referenced action, attached is the Paragraph 20 report regarding review of Continuous Opacity Monitoring (COM) data for the fourth quarter of 2018. If you have any questions regarding this report, please contact Jim Earl at 313-845-3217.



I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.


LaDale Combs
General Manager, Dearborn Works

4th Quarter 2018 Data Overview

During the fourth quarter of 2018, AK Steel experienced 153 events (excluding steam events) on which the 6-minute opacity block average exceeded 20%. This represents 0.7% of the number of 6-minute periods in the quarter. The breakdown of opacity events per month showed that October, November, and December experienced 36, 73, and 44 20% opacity events respectively. 29 of the November events were associated with a single incident that will be discussed in more detail below.

The 29 events mentioned previously occurred from November 8 at 2:12 PM to November 10 at 1:06 AM. There was no single cause apparent for this group of alarms. Rather, there was a group of possible contributors. First of all, the plant was starting up from a 72-hour planned outage. It is common after outages for the properties of the hot metal coming from the blast furnace to not have the same characteristics that it has when steady state operation is reached. Because the iron is chemically cold, the normal amount of heat in the BOF offgas is not generated. Since the heat drives the gas conditioning system, cold iron has the potential to cause gas conditioning problems. During this time, the BOF was also experiencing problems with the primary skimming operation. Skimming is normally performed prior to initiating the BOF process. However, with the skimming problems, extra fluxes have to be added in the BOF process. This has the potential to affect the characteristics of the particles that are being collected at the ESP. Finally, during this time frame, a compartment was also offline for annual maintenance and the pace of operations was slower than normal steady state conditions which is common when starting up from an outage.

AK Steel compensated for these conditions by implementing an ESP draft ramp down to reduce the flow to the ESP at the end of the heat. In addition, the steam conditioning program was adjusted to minimize the amount of steam that is injected between heats. During a long delay, this steam is a detriment as it simply leads to an unnecessary amount of moisture introduction to the ESP. These adjustments were effective on A-Vessel heats. When B-Vessel heats continued to exhibit higher than normal opacity, adjustments were made to the B-Vessel spray banks to allow for more water flow. These adjustments were effective at restoring opacity to normal levels. AK Steel will continue to evaluate draft ramp down programming, steam conditioning programming, and seasonal vessel spray water flow variations as needed to be more proactive in minimizing the duration of these types of events.

During the fourth quarter, annual maintenance was completed on ESP compartments 8, 4, and 1. As of the time of this report, maintenance is being performed on compartment 6. This maintenance required a compartment to be offline for significant periods of time during the quarter. The ESP operates efficiently when 7 of the 8 compartments are online. However, when a compartment is offline for annual maintenance, less flexibility exists to make adjustments while still maintaining optimal draft at the BOF vessels. Adjustments typically consist of balancing flow through each of the ESP compartments by adjusting the outlet louvers to those compartments. To maintain optimal draft, outlet louvers that are closed usually need to be offset by opening other outlet louvers. This balancing is a delicate process and is usually performed after consultation among BOF management as to the pros and cons of making certain adjustments. Because of this, more alarms typically occur when an ESP compartment is offline than when all eight compartments are in service.

A total of 35 ESP 20% opacity events were identified during the fourth quarter where the primary root cause was a longer than normal period of BOF downtime. Alarms of this type have been documented in previous reports and are primarily due to the design of the conditioning system for the ESP off gas. Water sprays that are used to condition the gas are triggered by offgas temperature. The ESP is cold after a period of BOF downtime which results in additional condensation within the ESP when the sprays are activated. In the winter months, the condition is amplified as the ESP cools much quicker, and relatively short periods of BOF downtime have the potential to have a larger impact on the overall ESP gas conditioning system.

A total of 14 ESP 20% opacity events were identified where a lack of conditioning at the end of the heats occurs due to a steep offgas temperature decline which causes the spray water to turn off. AK Steel has been unable to identify specific steel grades where this happens more often. However, the primary cause of this condition is that oxygen blowing has to be continued in some cases after the loss of spray water in order to meet quality criteria that are critical to downstream operations and the final product. The ESP draft ramp down mentioned earlier has been used to mitigate this condition and AK Steel continues to actively search for strategies to minimize opacity events of this type.

Finally, while AK Steel acknowledges that a portion of the increase in opacity events greater than 20% relative to the third quarter is due to the factors discussed above, it is also believed that the cool temperatures in the fourth quarter of the year (particularly in November and December) lead to a high bias in the opacity values. Part of AK Steel's internal investigation of opacity events involves a review of video of the ESP stack plume. If color is noted in the plume, the opacity event is classified as a non-steam event. For several of these instances, it is believed that the 6-minute block opacity is biased high due to the presence of steam.

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.2.)
4th Quarter 2018

The following instances were due either to low power levels on certain fields during the heat or to a field tripping out either during or just prior to a heat. When low power levels on certain fields persist towards the end of a heat, power-off rapping is performed on those fields once the heat is completed. If a C, D, or E field trips out, the field can usually be sectionalized and one of the C, D, or E fields can usually be returned to service. Adjustments to compartment outlet dampers can be made if needed to direct flow away from areas of the ESP that have fields offline.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
10/2/18 4:36 AM	21.5	Fields 1A and 6A experienced low power levels for the last third of the heat.	N/A	Power off rapping was performed on fields 1A and 6A after the completion of the heat.
10/6/18 5:18 AM	37.4	Fields 1A and 6A experienced low power levels for the second half of the heat.	N/A	Power off rapping was performed on fields 1A and 6A after the completion of the heat.
10/12/18 10:06 PM	21.1	Field 6A was out of service. Field 5-6C experienced low power levels for the second half of the heat.	N/A	Power off rapping was performed on field 5-6C after the completion of the heat.
11/1/18 9:30 PM	22.7	Field 6A experienced low power levels for the last third of the heat. Fields 8C, 8D, and 7E were out of service.	N/A	Power off rapping was performed on field 6A after the completion of the heat.
11/1/18 9:36 PM	20.9			
11/12/18 4:54 AM	23.4	Fields 1A, 6A, and 5-6C all experienced low power levels for the second half of the heat. In addition, compartment 8 was offline for annual maintenance.	N/A	Power off rapping was performed on fields 1A, 6A, and 5-6C after the completion of the heat.
11/13/18 12:48 AM	22.4	Field 6A experienced low power levels for the second half of the heat. In addition, compartment 8 was offline for annual maintenance.	N/A	Power off rapping was performed on field 6A after the completion of the heat.
11/19/18 2:30 AM	30.0	Fields 1A, 2A, and 6A experienced all low power levels for the second half of the heat. In addition, compartment 8 was offline for annual maintenance.	N/A	Power off rapping was performed on all of the A-fields after the completion of the heat.
12/9/18 12:00 PM	66.0	Fields 2A, 7A, 8A, and 7-8C all experienced low power levels for the second half of the heat. In addition, compartment 4 was offline for annual maintenance and field 8C was out of service.	N/A	Power off rapping was performed on fields 2A, 7A, 8A, and 7-8C after the completion of the heat.
12/9/18 12:06 PM	22.9			

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

The following instances were due either to low power levels on certain fields during the heat or to a field tripping out either during or just prior to a heat. When low power levels on certain fields persist towards the end of a heat, power-off rapping is performed on those fields once the heat is completed. If a C, D, or E field trips out, the field can usually be sectionalized and one of the C, D, or E fields can usually be returned to service. Adjustments to compartment outlet dampers can be made if needed to direct flow away from areas of the ESP that have fields offline.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
12/9/18 3:12 PM	30.9	Field 8A experienced low power levels towards the end of the heat. In addition, compartment 4 was offline for annual maintenance and field 8C was out of service.	N/A	Power off rapping was performed on field 8A after the completion of the heat.
12/10/18 3:36 AM	25.3	Field 7A experienced low power levels for the second half of the heat. In addition, compartment 4 was offline for annual maintenance and field 8C was out of service.	N/A	Power off rapping was performed on field 7A after the completion of the heat.
12/13/18 2:24 AM	22.3	Several fields experienced low power levels towards the end of the heat with dust density probes indicating that compartments 2 and 4 were receiving the heaviest load. In addition, compartment 1 was offline for annual maintenance.	N/A	Power off rapping was performed on fields 2-6A, 2-6C, and 2-6D after the completion of the heat.

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

The following instances occurred following longer than normal periods of BOF downtime. When the BOF melting operations are resumed after an extended downtime period, opacity spikes are likely until steady state conditions are reached. Water sprays to condition the gas sample are triggered by temperature. The ESP is cold after a period of BOF downtime which results in additional condensation within the ESP when the sprays are activated. The ESP is typically reconditioned after one heat.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
10/4/18 5:06 PM	21.7	Approximately 2 hours 6 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning.	N/A	Power off rapping was performed on all of the A-fields after the completion of the heat.
10/4/18 5:12 PM	25.5			
10/6/18 2:12 AM	24.7	Approximately 1 hour 23 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning. In addition, fields 1A and 6A both experienced low power levels for the second half of the heat.	N/A	Power off rapping was performed on fields 1A and 6A after the completion of the heat.
10/10/18 5:30 AM	30.0	Approximately 3 hours 17 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning. In addition, several A-fields as well as field 7-8C struggled with declining voltage throughout the heat.	N/A	Power off rapping was performed on all of the A-fields after the completion of the heat. Field 8C was isolated after the completion of the heat and field 7C was returned to service.
10/10/18 5:36 AM	39.3			
10/10/18 5:42 AM	30.3			
10/15/18 7:30 AM	41.8	Approximately 7 hours 32 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning. All A-fields struggled during the heat.	N/A	Power off rapping was performed on all A, C, and D fields after the completion of the heat.
10/15/18 7:36 AM	53.9			
10/15/18 7:42 AM	51.7			

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

The following instances occurred following longer than normal periods of BOF downtime. When the BOF melting operations are resumed after an extended downtime period, opacity spikes are likely until steady state conditions are reached. Water sprays to condition the gas sample are triggered by temperature. The ESP is cold after a period of BOF downtime which results in additional condensation within the ESP when the sprays are activated. The ESP is typically reconditioned after one heat.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
10/25/18 8:48 PM	35.5	Approximately 1 hour 25 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning. In addition, field 6A experienced low power levels at the end of the heat and fields 7E, 8C, and 8D were out of service.	N/A	Power off rapping was performed on all of the A-fields after the completion of the heat.
11/2/18 5:48 AM	30.1	Approximately 2 hours 30 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning. In addition, all AVC's struggled the last two thirds of the heat.	N/A	Power off rapping was performed on all A, C, and D fields after the completion of the heat.
11/2/18 5:54 AM	78.8			
11/2/18 6:00 AM	85.1			
11/2/18 6:06 AM	36.1			
11/11/18 11:36 AM	22.1	Approximately 1 hour 29 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning. In addition, compartment 8 was offline for annual maintenance and fields 1A, 6A, and 5-6C experienced low power levels for the second half of the heat.	N/A	Power off rapping was performed on fields 1A, 6A, and 5-6C after the completion of the heat.
11/11/18 11:42 AM	52.3			
11/15/18 3:06 PM	30.0	Approximately 59 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning. In addition, compartment 8 was offline for annual maintenance. The heat experienced 2 aborts which further contributed to the opacity.	N/A	None Taken

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

The following instances occurred following longer than normal periods of BOF downtime. When the BOF melting operations are resumed after an extended downtime period, opacity spikes are likely until steady state conditions are reached. Water sprays to condition the gas sample are triggered by temperature. The ESP is cold after a period of BOF downtime which results in additional condensation within the ESP when the sprays are activated. The ESP is typically reconditioned after one heat.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
11/16/18 9:06 AM	30.3	Approximately 6 hours 6 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning. In addition, compartment 8 was offline for annual maintenance, field 7E was out of service, field 5-6C tripped out just after the heat was started, and fields 1A and 6A experienced low power levels for the last third of the heat.	N/A	Field 6C was isolated and field 5C was returned to service prior to the next heat. Power off rapping was performed on fields 1A and 6A after the completion of the heat.
11/16/18 9:12 AM	60.0			
11/16/18 9:18 AM	29.0			
11/16/18 9:30 AM	30.2			
11/18/18 5:00 PM	21.2	Approximately 1 hour 6 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning. In addition, compartment 8 was offline for annual maintenance and fields 1A, 6A, and 5-6C experienced low power levels at the end of the heat.	N/A	Power off rapping was performed on all of the A-fields after the completion of the heat.
12/6/18 1:36 PM	30.8	Approximately 1 hour 6 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning. In addition, compartment 4 was offline for annual maintenance and field 8C was out of service.	N/A	Power off rapping was performed on fields 1A, 2A, 3A, and 5A after the completion of the heat.
12/6/18 1:42 PM	42.4			
12/7/18 1:48 PM	25.1	Approximately 1 hour 12 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning. In addition, compartment 4 was offline for annual maintenance and field 7-8C tripped out of service towards the end of the heat.	N/A	Field 7-8C was returned to service prior to the following heat.

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

The following instances occurred following longer than normal periods of BOF downtime. When the BOF melting operations are resumed after an extended downtime period, opacity spikes are likely until steady state conditions are reached. Water sprays to condition the gas sample are triggered by temperature. The ESP is cold after a period of BOF downtime which results in additional condensation within the ESP when the sprays are activated. The ESP is typically reconditioned after one heat.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
12/8/18 4:06 AM	22.6	Approximately 1 hour 11 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning. In addition, compartment 4 was offline for annual maintenance, field 8C was out of service, and field 5-6D tripped out approximately a third of the way into the blow.	N/A	Power off rapping was performed on field 8A after the completion of the heat.
12/28/18 1:00 PM	45.2	Approximately 4 hours 4 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning. In addition, field 6A experienced low power levels for the final third of the heat.	N/A	Power off rapping was performed on field 6A after the completion of the heat.
12/28/18 1:06 PM	26.3			
12/29/18 11:48 AM	22.5	Approximately 2 hours 26 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning. In addition, field 8A experienced low power levels for the final third of the heat.	N/A	Power off rapping was performed on field 8A after the completion of the heat.
12/29/18 11:54 AM	26.6			
12/29/18 4:36 PM	21.3	Approximately 1 hour 35 minutes of downtime occurred between heats. The ESP temperature cooled which has an effect on gas conditioning.	N/A	Power off rapping was performed on fields 1-6A after the completion of the heat.
12/29/18 4:42 PM	27.1			
12/29/18 4:48 PM	20.8			

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

The following instances occurred following longer than normal periods of BOF downtime. When the BOF melting operations are resumed after an extended downtime period, opacity spikes are likely until steady state conditions are reached. Water sprays to condition the gas sample are triggered by temperature. The ESP is cold after a period of BOF downtime which results in additional condensation within the ESP when the sprays are activated. The ESP is typically reconditioned after one heat.

[illegible]

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

The following instances occurred either during a startup or a shutdown of the BOF and ESP or during the startup or shutdown on an ESP ID Fan. Procedures for startup and shutdown are in place to minimize instances of elevated opacity. If a pattern of events leading to an elevated opacity is identified, a startup or shutdown procedure can be revised to minimize emissions.

[illegible]

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

For the following instances, either a root cause could not be identified or the root cause is different than what is discussed elsewhere.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
10/5/18 8:12 PM	28.4	ESP ID Fan 4 was out of service for maintenance. This created a flow imbalance where certain compartments were receiving more airflow and particulate loading than normal. In addition, fields 1A and 6A experienced low power levels for several of the heats during the time frame when the fan was offline.	N/A	Tuning was conducted between 10/2 when the fan was taken offline and 10/8 when the fan was returned to service to optimize the flow. The fan was returned to service on 10/8. Power off rapping was performed between heats as needed, particularly on fields 1A and 6A.
10/5/18 9:06 PM	24.6			
10/5/18 9:12 PM	24.7			
10/7/18 7:30 PM	20.8			
10/7/18 8:12 PM	22.4			
10/7/18 8:18 PM	30.2			
10/8/18 2:12 AM	23.2			
10/9/18 9:00 AM	25.1	Fields 3-4D, 7E, and 8C were out of service due to grounds and field 7-8D was out of service due to a bad TR set. Dust density readings indicated that compartments 1 and 3 were receiving higher particulate loading than the other compartments.	N/A	The TR set on 7-8D was replaced during the day. An adjustment was made on the compartment 3 outlet louver to reduce the flow through that compartment on the morning of 10/10. Power off rapping was performed routinely between heats, particularly on field 1A.

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

For the following instances, either a root cause could not be identified or the root cause is different than what is discussed elsewhere.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
10/7/18 7:00 PM	22.7	Spray water cut back late in the heat as the temperature of the vessel offgas dipped. The lack of conditioning led to an opacity spike.	N/A	This type of opacity event continues to be investigated. In each of these cases, offgas temperature falls very rapidly which leads to the water sprays also turning off rapidly. Oxygen blowing continues to meet quality specifications that are important for the final steel product. A review of the different grades of steel did not reveal any grade where this was more of an issue. In cases where this is occurring repeatedly, a draft ramp down is typically put in to reduce the flow going to the ESP at the end of the heat.
11/2/18 7:00 PM	21.9			
11/5/18 4:24 AM	37.7			
11/5/18 5:54 AM	26.5			
11/5/18 6:00 AM	22.9			
11/5/18 8:00 AM	24.1			
11/5/18 10:06 AM	24.2			
11/5/18 12:30 PM	25.7			
11/10/18 4:36 PM	22.6			
11/16/18 10:18 AM	30.0			

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

For the following instances, either a root cause could not be identified or the root cause is different than what is discussed elsewhere.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
11/19/18 1:24 AM	22.1	Spray water cut back late in the heat as the temperature of the vessel offgas dipped. The lack of conditioning led to an opacity spike.	N/A	This type of opacity event continues to be investigated. In each of these cases, offgas temperature falls very rapidly which leads to the water sprays also turning off rapidly. Oxygen blowing continues to meet quality specifications that are important for the final steel product. A review of the different grades of steel did not reveal any grade where this was more of an issue. In cases where this is occurring repeatedly, a draft ramp down is typically put in to reduce the flow going to the ESP at the end of the heat.
12/10/18 6:30 AM	23.8			
12/14/18 3:36 PM	24.6			
12/25/18 12:54 AM	21.2			

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

For the following instances, either a root cause could not be identified or the root cause is different than what is discussed elsewhere.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
10/12/18 8:42 PM	21.0	Field 6A tripped out of service prior to the heat. Field 5-6C experienced low power levels for the second half of the heat. Fields 8C and 8D were both out of service. The ESP operator failed to follow the appropriate procedures relating to actions to take when an A-fields trips out of service.	N/A	Re-training was conducted with all ESP operators on the ESP Malfunction Troubleshooting Procedure.
10/12/18 8:54 AM	21.0	A heat was initiated without power off rapping between heats. Field 6A was out of service, field 5-6C was low for the majority of the heat, and fields 8C and 8D were out of service.	N/A	Power off rapping was performed on all A-fields as well as field 5-6C after the completion of the heat. The outlet louver for compartment 6 was closed 5% to reduce the amount of flow through that compartment.
10/14/18 7:42 AM	20.6	Power off rapping was being performed simultaneously on fields 1A-4A during a reblow. The ability to turn several fields off simultaneously for power off rapping had been implemented shortly beforehand.	N/A	An Environmental contact was distributed on 10/15 requiring the capture system to be in TAP Mode before power off rapping of multiple fields is performed. Logic was implemented on 10/18 to prevent charging or blowing when this type of rapping is taking place.
10/15/18 7:48 AM	24.6		N/A	
10/15/18 8:36 AM	27.0	The ESP was still in the process of recovering from a greater than 7 hour delay 2 heats previously. Dust density levels indicated that several compartments were still performing sub-optimally.	N/A	Power off rapping was performed on all of the A-fields after the completion of the heat.
10/15/18 8:42 AM	20.9			

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

For the following instances, either a root cause could not be identified or the root cause is different than what is discussed elsewhere.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
10/16/18 3:00 PM	48.9	Fields 8C and 8D were out of service. Field 8E tripped out at the beginning of the heat leaving only the A-field in service on compartment 8.	N/A	The blow rate was reduced and the compartment 8 outlet louver was closed 15% to reduce flow through that compartment. A vacuum truck contractor was contacted to assist with cleaning the compartment 8 fields. Field 8E was returned to service at 17:18.
10/16/18 3:06 PM	66.7			
10/16/18 4:12 PM	29.7	Fields 8C, 8D, and 8E were out of service. Dust density probes indicated that compartment 1 was receiving higher particulate loading than the other compartments.	N/A	Field 8E was returned to service at 17:18. The compartment 1 outlet louver was closed 5% to reduce flow through that compartment.
10/16/18 4:18 PM	22.5			
10/25/18 11:48 PM	20.7	Fields 7E, 8C, and 8D were out of service. None of the AVC voltages bottomed out but most fields struggled through the heat. Dust density probes indicated that compartment 8 was receiving higher particulate loading than the other compartments.	N/A	Power off rapping was performed on all the A-fields after the completion of the heat.
10/27/18 5:36 PM	36.6	Fields 5-6E, 8C, and 8D were out of service. The rappers for fields 5E and 6E were not turned off as required by procedure.	N/A	Field 6E was isolated and field 5E was returned to service at 17:52. BOF management retrained the ESP operator on the requirement to turn E-field rappers off when the E-field is offline. Retraining was conducted with all operators during the course of their individual shifts.
10/27/18 5:42 PM	25.4			
10/27/18 5:54 PM	21.9			

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

For the following instances, either a root cause could not be identified or the root cause is different than what is discussed elsewhere.

Date / Time	6-Min Avg Opacity	Section 8.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
11/2/18 12:54 AM	21.4	A root cause could not be determined.	The investigation revealed several possible contributors. Fields 8C, 8D, and 7E were out of service. Heavy rain occurred at the time which could have caused an influx of moisture into the ESP. AVC data was reviewed and showed no abnormalities. Dust density data indicated that compartments 2 and 4 were receiving the highest load. The water spray system and ESP fan operation were also reviewed with no abnormalities noted. Refer to Attachment 1 for trending and operator log sheets.	Power off rapping was performed on fields 1A, 2A, 3A, 4A, 1-2C, 1-2D, 3-4C, and 3-4D after the completion of the heat.
11/2/18 1:00 AM	21.4			
11/2/18 6:54 AM	26.5	The ESP was still in the process of recovering from a 2.5 hour delay 2 heats previously. Dust density levels indicated that several compartments were still performing sub-optimally.	N/A	Power off rapping was performed on all A, C, and D fields after the completion of the heat.
11/12/18 7:18 AM	50.8	The opacity event occurred during the first heat on B-Vessel in approximately 13 hours. The B-stack was cool which affected the gas conditioning. In addition, compartment 8 was offline for maintenance.	N/A	Power off rapping was performed on all A, C, and D fields for compartments 1-4 and on field 6A after the completion of the heat.
11/12/18 7:24 AM	45.0			

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

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Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
11/3/18 12:30 AM	28.3	A root cause could not initially be determined. Upon further review, the cause of the opacity appears to be the same type of end of heat conditioning discussed earlier in the report.	Refer to Attachment 2 for trending and operating data.	No further corrective action was taken outside of the investigation.
11/10/18 5:36 AM	21.6	A root cause could not initially be determined. Upon further review, the cause of the opacity appears to be the same type of end of heat conditioning discussed earlier in the report.	Refer to Attachment 3 for trending and operating data.	Power off rapping was performed on all A-fields after the completion of the heat.

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

For the following instances, either a root cause could not be identified or the root cause is different than what is discussed elsewhere.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
11/8/18 2:12 PM	29.1	Several root causes were investigated for this group of opacity alarms. Initially, it was believed that the high opacity was a function of slow operating pace (coming out of a 3 day outage), colder than normal iron, and flux compensation due to the primary skimming station being unavailable. In addition, compartment 8 was out of service for annual maintenance. Several adjustments that were made began to have a positive effect upon A-Vessel heats. When B-Vessel heats continued to experience opacity problems, the focus turned to making adjustments to the B-Vessel offgas conditioning parameters.	See Attachment 4 for details concerning when different actions were taken and how they effected the overall opacity .	Power off rapping was performed on all low power fields (and sometimes on all except E-fields depending on scheduled time between heats) in between heats. Adjustments were made to the steam conditioning programming to lessen the amount of steam introduced to the conditioning system between heats and thereby reduce unnecessary moisture introduction to the ESP. Since most of the opacity alarms were occurring at the end of heats, a program was implemented to ramp the draft down for the final one third of the heat to reduce the particulate load on the ESP during this time. These adjustments were effective at reducing opacity alarms while blowing on A-Vessel. When B-Vessel heats continued to exhibit high opacity, adjustments were made to several spray bank setpoints and deadbands. In addition, adjustments were made to the spray bank water flow by increasing the amount of spray bank nozzles in service. Opacity on B-Vessel heats improved with these adjustments and the period of high opacity ended at approximately 2:00 AM on 11/10. A more detailed explanation of corrective action timing and examples of opacity trending is attached as Attachment 4. Steam programming has now been adjusted to where steam comes on at the charge. Boiler operators have been instructed not to reset the steam. It is anticipated that less steam flow between heats will improve ESP performance by limiting moisture introduction during delays.
11/8/18 3:54 PM	22.6			
11/8/18 7:06 PM	22.5			
11/8/18 10:30 PM	56.9			
11/8/18 10:36 PM	73.5			
11/8/18 11:48 PM	39.2			
11/9/18 12:48 AM	68.4			
11/9/18 2:00 AM	68.1			
11/9/18 12:48 AM	68.4			
11/9/18 2:48 AM	30.6			

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

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Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
11/9/18 4:18 AM	33.5	Several root causes were investigated for this group of opacity alarms. Initially, it was believed that the high opacity was a function of slow operating pace (coming out of a 3 day outage), colder than normal iron, and flux compensation due to the primary skimming station being unavailable. In addition, compartment 8 was out of service for annual maintenance. Several adjustments that were made began to have a positive effect upon A-Vessel heats. When B-Vessel heats continued to experience opacity problems, the focus turned to making adjustments to the B-Vessel offgas conditioning parameters.	See Attachment 4 for details concerning when different actions were taken and how they effected the overall opacity .	Power off rapping was performed on all low power fields (and sometimes on all except E-fields depending on scheduled time between heats) in between heats. Adjustments were made to the steam conditioning programming to lessen the amount of steam introduced to the conditioning system between heats and thereby reduce unnecessary moisture introduction to the ESP. Since most of the opacity alarms were occurring at the end of heats, a program was implemented to ramp the draft down for the final one third of the heat to reduce the particulate load on the ESP during this time. These adjustments were effective at reducing opacity alarms while blowing on A-Vessel. When B-Vessel heats continued to exhibit high opacity, adjustments were made to several spray bank setpoints and deadbands. In addition, adjustments were made to the spray bank water flow by increasing the amount of spray bank nozzles in service. Opacity on B-Vessel heats improved with these adjustments and the period of high opacity ended at approximately 2:00 AM on 11/10. A more detailed explanation of corrective action timing and examples of opacity trending is attached as Attachment 4. Steam programming has now been adjusted to where steam comes on at the charge. Boiler operators have been instructed not to reset the steam. It is anticipated that less steam flow between heats will improve ESP performance by limiting moisture introduction during delays.
11/9/18 5:24 AM	21.5			
11/9/18 5:30 AM	38.8			
11/9/18 8:00 AM	55.3			
11/9/18 8:06 AM	60.9			
11/9/18 9:18 AM	32.7			
11/9/18 9:24 AM	39.8			
11/9/18 9:36 AM	27.7			
11/9/18 10:18 AM	24.4			
11/9/18 1:06 PM	36.4			

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

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Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
11/9/18 2:00 PM	42.3	Several root causes were investigated for this group of opacity alarms. Initially, it was believed that the high opacity was a function of slow operating pace (coming out of a 3 day outage), colder than normal iron, and flux compensation due to the primary skimming station being unavailable. In addition, compartment 8 was out of service for annual maintenance. Several adjustments that were made began to have a positive effect upon A-Vessel heats. When B-Vessel heats continued to experience opacity problems, the focus turned to making adjustments to the B-Vessel offgas conditioning parameters.	See Attachment 4 for details concerning when different actions were taken and how they effected the overall opacity .	Power off rapping was performed on all low power fields (and sometimes on all except E-fields depending on scheduled time between heats) in between heats. Adjustments were made to the steam conditioning programming to lessen the amount of steam introduced to the conditioning system between heats and thereby reduce unnecessary moisture introduction to the ESP. Since most of the opacity alarms were occurring at the end of heats, a program was implemented to ramp the draft down for the final one third of the heat to reduce the particulate load on the ESP during this time. These adjustments were effective at reducing opacity alarms while blowing on A-Vessel. When B-Vessel heats continued to exhibit high opacity, adjustments were made to several spray bank setpoints and deadbands. In addition, adjustments were made to the spray bank water flow by increasing the amount of spray bank nozzles in service. Opacity on B-Vessel heats improved with these adjustments and the period of high opacity ended at approximately 2:00 AM on 11/10. A more detailed explanation of corrective action timing and examples of opacity trending is attached as Attachment 4. Steam programming has now been adjusted to where steam comes on at the charge. Boiler operators have been instructed not to reset the steam. It is anticipated that less steam flow between heats will improve ESP performance by limiting moisture introduction during delays.
11/9/18 5:12 PM	36.2			
11/9/18 5:18 PM	49.2			
11/9/18 7:24 PM	40.7			
11/9/18 7:30 AM	40.8			
11/9/18 8:12 PM	27.0			
11/9/18 9:36 PM	44.1			
11/9/18 11:36 PM	25.9			
11/10/18 1:06 AM	22.2			

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

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Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
11/12/18 2:36 PM	31.4	No. 8 spray bank on B-Vessel malfunctioned due to a faulty sensor. This led to an influx of water running down the hood. Adjustments were made to the spray banks to reduce water flow to correct this problem. This led to a lack of good gas conditioning. In addition, compartment 8 was also offline for annual maintenance.	N/A	The No. 8 spray bank sensor was bypassed and air flow was restored to the No. 8 bank. Spray bank flow for the other banks was readjusted to provide proper gas conditioning.
11/12/18 2:42 PM	40.0			
11/12/18 2:48 PM	26.6			
11/12/18 3:36 PM	34.5			
11/12/18 3:42 PM	26.7			
11/19/18 7:00 AM	56.1	Spray water flow was not sufficient for changing weather conditions. In addition, compartment 8 was offline for maintenance.	N/A	Adjustments were made to the spray banks to provide for increased flow on B-Vessel heats.
11/19/18 6:00 PM	35.1	Conditioning problems continued to occur on B-Vessel heats. Compartment 8 was offline for maintenance.	N/A	Compartment 8 was returned to service after the completion of the 7:00 PM heat. Power off rapping was performed on multiple A-fields in between heats.
11/19/18 7:00 PM	32.2			
11/29/18 1:00 PM	24.0	Opacity occurred after a blow was reinitialized after a lance pull.	N/A	A lance pull is a somewhat rare occurrence and typically occurs automatically due to certain safety parameters not being met.
12/5/18 6:18 AM	21.0	Heat was relatively cool which prevented several spray banks from activating. This led to insufficient off gas conditioning.	N/A	The reason for the low offgas temperatures could not be identified. This did not reoccur on subsequent heats later in the day.

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4th Quarter 2018

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12/6/18 8:30 PM	29.0	The oxygen blow was interrupted approximately a third of the way through. The blow was not re-initiated for 49 minutes.	N/A	No corrective action was taken. Opacity declined rapidly after the blow was restarted.
12/20/18 10:30 AM	21.2	A root cause could not be determined. Compartment 1 was out of service for annual maintenance and field 5-6D was returned to service just prior to the start of the heat. Dust density readings on compartment 6 were high for most of the heat. The ESP operator sheets recorded that field 3A experienced a low power alarm but the trend does not show any abnormally low power levels.	See Attachment 5 for trending and operating data.	Power off rapping was performed on fields 3A and 6A after the completion of the heat.
12/20/18 3:54 PM	60.2	While returning compartment 1 to service, the outlet louver was opened before the AVC's were turned on. The relevant procedure for returning a compartment to service requires that the AVC's be turned on first.	N/A	All relevant personnel were retrained on the appropriate ESP startup and shutdown procedures as well as the compartment isolation and returning compartment to service procedures.
12/20/18 4:00 PM	48.3			
12/25/18 3:00 AM	21.8	Fields 2A and 6A both tripped out early in the heat. The procedure for reacting to this requires that the outlet louvers be closed 10% on each field. The operator failed to follow the procedure.	N/A	The vacuum contractor was notified to assist with clearing the hoppers on compartments 2 and 6. Compartment 2 was returned to service at 4:56 AM and compartment 6 was returned to service at 5:53 AM. The operator was retrained on the appropriate ESP Malfunction Procedure.
12/25/18 3:48 AM	43.4			
12/25/18 3:54 AM	33.5			

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4th Quarter 2018

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12/26/18 4:12 AM	25.6	The ESP started to experience opacity tail spikes at the end of heats starting at 4:12 AM. During this time, most fields showed a general downward trend through the heat. Dust density readings indicated that compartments 2,4,7, and 8 were most affected. A review of the ESP Shift Checklists indicated that there were some problems with dust buildup in some of the compartments.	See Attachment 6 for trending and operating data.	A draft ramp was put in to slowly reduce the draft from 2.8 to 2.4 at the end of the heat to reduce the load on the ESP during the end of the heat. A vacuum truck contractor was called in to assist with clearing out dust buildup. Compartments 2,4, and 8 in particular had a significant buildup that needed to be cleared out. No further 20% alarms occurred on 12/26 after the draft ramp was implemented.
12/26/18 5:00 AM	24.8			
12/26/18 5:48 AM	46.2			
12/26/18 5:54 AM	31.8			
12/26/18 7:30 AM	29.4			
12/26/18 8:24 AM	26.4			
12/26/18 9:00 AM	24.0			
12/26/18 10:00 AM	23.6			
12/27/18 5:54 PM	21.2	The root cause could not be determined. AVC's were ok throughout the heat. Dust density readings indicated that compartments 1 and 2 were receiving the highest load.	See Attachment 7 for trending and operating data.	Power off rapping was performed on fields 1A, 2A, 3-4C, 3A, 4A, and 6A after the completion of the heat. No further 20% alarms occurred for the remainder of the day.
12/27/18 6:00 PM	20.9			

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4th Quarter 2018

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Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
12/29/18 12:54 PM	29.6	A review of dust density levels indicated that compartment 2 was receiving higher PM loading than the other compartments.	N/A	Extensive power off rapping was performed after the completion of each heat. The No. 2 compartment outlet louver was closed approximately 2% at 4:50 PM to reduce the flow through that compartment.
12/29/18 1:54 PM	39.2			
12/29/18 2:54 PM	27.3			
12/30/18 5:06 AM	24.4	The root cause could not be determined. AVC's were ok throughout the heat. Dust density readings indicated that compartments 1 and 5 were receiving the highest load. A review of the ESP Operations Shift Checksheet indicated that field 1-2C did trip out a couple of times just after this heat. This could be an indication of dust buildup in one of those compartments that was affecting its performance.	See Attachment 8 for trending and operating data.	Power off rapping was performed on the compartment 1 and compartment 5 A, C, and D fields after the completion of the heat.
12/31/18 10:06 AM	24.0	The root cause could not be determined. AVC's trended down through the heat but none bottomed out. Dust density readings indicated that compartment 5 was receiving the highest load. A possible contributor could be chemically cold iron as this was the last heat processed before a 24-hour outage.	See Attachment 9 for trending and operating data.	The heat was the final heat prior to a 24-hour outage
12/31/18 10:12 AM	31.0			

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

The following instances occurred due to steam interference.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
10/6/18 2:12 AM	23.1	Steam Interference	N/A	N/A
10/25/18 8:36 PM	32.7	Steam Interference	N/A	N/A
10/25/18 8:42 PM	49.1	Steam Interference	N/A	N/A
11/5/18 2:00 PM	51.8	Steam Interference	N/A	N/A
11/5/18 2:06 PM	39.2	Steam Interference	N/A	N/A
11/5/18 2:12 PM	39.5	Steam Interference	N/A	N/A
11/5/18 2:18 PM	30.3	Steam Interference	N/A	N/A
11/8/18 7:00 PM	41.2	Steam Interference	N/A	N/A
11/8/18 11:42 PM	24.1	Steam Interference	N/A	N/A
11/9/18 1:54 AM	22.9	Steam Interference	N/A	N/A

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
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The following instances occurred due to steam interference.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
11/9/18 4:12 AM	20.6	Steam Interference	N/A	N/A
11/9/18 7:54 AM	20.7	Steam Interference	N/A	N/A
11/9/18 1:00 PM	37.6	Steam Interference	N/A	N/A
11/9/18 1:54 PM	21.9	Steam Interference	N/A	N/A
11/9/18 9:30 PM	24.1	Steam Interference	N/A	N/A
11/10/18 6:30 AM	20.6	Steam Interference	N/A	N/A
11/10/18 6:36 AM	28.8	Steam Interference	N/A	N/A
11/11/18 4:00 AM	43.6	Steam Interference	N/A	N/A
11/11/18 11:48 AM	25.8	Steam Interference	N/A	N/A
11/12/18 2:36 AM	24.5	Steam Interference	N/A	N/A

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

The following instances occurred due to steam interference.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
11/12/18 7:12 AM	25.3	Steam Interference	N/A	N/A
11/12/18 8:24 AM	21.6	Steam Interference	N/A	N/A
11/12/18 11:12 AM	21.1	Steam Interference	N/A	N/A
11/12/18 11:18 AM	26.0	Steam Interference	N/A	N/A
11/12/18 11:24 AM	23.2	Steam Interference	N/A	N/A
11/17/18 7:48 PM	24.7	Steam Interference	N/A	N/A
11/18/18 7:30 AM	22.0	Steam Interference	N/A	N/A
11/18/18 7:18 PM	22.0	Steam Interference	N/A	N/A
11/18/18 9:24 PM	22.5	Steam Interference	N/A	N/A
11/19/18 2:24 AM	25.4	Steam Interference	N/A	N/A

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

The following instances occurred due to steam interference.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
11/19/18 3:54 AM	25.5	Steam Interference	N/A	N/A
11/19/18 4:00 AM	25.1	Steam Interference	N/A	N/A
11/19/18 6:54 AM	29.9	Steam Interference	N/A	N/A
11/19/18 8:18 AM	26.0	Steam Interference	N/A	N/A
11/20/18 7:30 AM	24.4	Steam Interference	N/A	N/A
12/5/18 6:12 AM	23.9	Steam Interference	N/A	N/A
12/7/18 9:54 PM	24.3	Steam Interference	N/A	N/A
12/7/18 10:00 PM	40.9	Steam Interference	N/A	N/A
12/8/18 3:48 AM	36.7	Steam Interference	N/A	N/A
12/8/18 3:54 AM	45.8	Steam Interference	N/A	N/A

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

The following instances occurred due to steam interference.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
12/8/18 4:00 AM	67.3	Steam Interference	N/A	N/A
12/8/18 11:24 AM	22.1	Steam Interference	N/A	N/A
12/8/18 11:30 AM	41.0	Steam Interference	N/A	N/A
12/9/18 10:30 AM	22.5	Steam Interference	N/A	N/A
12/9/18 10:36 AM	53.8	Steam Interference	N/A	N/A
12/9/18 10:42 AM	35.7	Steam Interference	N/A	N/A
12/9/18 10:48 AM	25.5	Steam Interference	N/A	N/A
12/9/18 11:48 AM	25.2	Steam Interference	N/A	N/A
12/9/18 11:54 AM	20.5	Steam Interference	N/A	N/A
12/10/18 8:36 PM	28.5	Steam Interference	N/A	N/A

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

The following instances occurred due to steam interference.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
12/17/18 12:48 PM	23.4	Steam Interference	N/A	N/A
12/18/18 4:00 AM	37.0	Steam Interference	N/A	N/A
12/18/18 4:06 AM	37.0	Steam Interference	N/A	N/A
12/18/18 11:36 AM	29.3	Steam Interference	N/A	N/A
12/19/18 4:36 AM	27.6	Steam Interference	N/A	N/A
12/19/18 4:42 AM	38.1	Steam Interference	N/A	N/A
12/19/18 5:18 PM	22.5	Steam Interference	N/A	N/A
12/28/18 12:54 PM	20.9	Steam Interference	N/A	N/A
12/29/18 11:00 PM	27.4	Steam Interference	N/A	N/A
12/29/18 11:06 PM	20.9	Steam Interference	N/A	N/A

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

The following instances occurred due to steam interference.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
12/30/18 11:24 AM	26.9	Steam Interference	N/A	N/A
12/30/18 5:36 PM	37.2	Steam Interference	N/A	N/A
12/30/18 5:42 PM	32.7	Steam Interference	N/A	N/A
12/30/18 7:06 PM	20.9	Steam Interference	N/A	N/A
12/31/18 1:00 AM	29.6	Steam Interference	N/A	N/A
12/31/18 1:06 AM	28.1	Steam Interference	N/A	N/A
12/31/18 1:12 AM	24.3	Steam Interference	N/A	N/A
12/31/18 5:42 AM	34.0	Steam Interference	N/A	N/A
12/31/18 5:48 AM	22.0	Steam Interference	N/A	N/A
12/31/18 5:54 AM	27.2	Steam Interference	N/A	N/A

ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.2.)
4th Quarter 2018

The following instances occurred due to steam interference.

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ESP 20% Opacity Report (Required by Consent Decree for Civil Action No. 15-cv-11804; section B.20.)
4th Quarter 2018

The following instances occurred due to daily or quarterly calibration checks or during maintenance on the COMS.

Date / Time	6-Min Avg Opacity	Section B.20.a Identify the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity;	Section B.20.b When the root cause is unknown, provide a description of efforts taken by Defendant to investigate the root cause of each 6-minute block average reading that exceeds 20% opacity, including a copy of any related ESP operating records;	Section B.20.c Describe corrective actions taken in response to the root cause of each instance in which the 6-minute block average reading exceeds 20% opacity, including but not limited to a copy of related work orders or other documents submitted to address the cause of the high reading, if any;
11/9/18 10:12 AM	22.2	COMS Daily Calibration	N/A	N/A
11/13/18 10:36 AM	22.1	Quarterly COMS calibration and maintenance checks	N/A	N/A
11/13/18 10:42 AM	24.2	Quarterly COMS calibration and maintenance checks	N/A	N/A
11/13/18 10:48 AM	29.8	Quarterly COMS calibration and maintenance checks	N/A	N/A
11/13/18 10:54 AM	46.4	Quarterly COMS calibration and maintenance checks	N/A	N/A
11/13/18 11:00 AM	46.4	Quarterly COMS calibration and maintenance checks	N/A	N/A